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## **EFFECTS OF MUSIC AND HEMI-SYNC® ON A CHILD WITH A SEIZURE DISORDER**

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The normal central nervous system organizes and integrates information from all sensory channels and makes it possible for the individual to focus attention and separate foreground from background information. The child who is unable to deal efficiently with incoming information may resort to drastic measures in order to survive in a very chaotic world. Clinically one may observe a child who appears to be profoundly retarded and unresponsive visually or auditorially. Rhythmical self-stimulation activities such as rocking, head banging, or thumb sucking may occur. There is frequent withdrawal from social contact and poor eye contact with others. Gaze aversion may be used as a way of reducing sensory input. Many of these children have a history of seizures and may be on anti-convulsant medication. These are children with substantial disorganization of brain function who become functionally more limited as they attempt to block out confusing sensory input.

Since my initial experience with Hemi-Sync, I have been fascinated by the potential of the hemi-sync signal to assist the damaged brain in achieving a greater state of balance and organization. During the past year I have explored the use of the tapes with young brain injured children. The following case history documents an intriguing hypothesis and series of events. It also raises a series of critical questions in the effective use of Hemi-Sync with this population of children.

### **HISTORY OF THE PROBLEM**

K., a 7-year-old with a diagnosis of cerebral palsy, profound mental retardation, emotional disturbance, and uncontrolled seizures was referred for evaluation and a period of therapy to improve movement and communication skills. K. had been admitted to a residential facility for neurologically impaired children with emotional problems because of behaviors associated with her seizures. K. appeared to be triggering frequent seizures by a rhythmical blowing behavior resulting in hyperventilation followed by a seizure with momentary loss of consciousness. As many as 10 seizures per hour had been recorded. A behavior modification program was utilized in her daily program. K. was placed in a "time out room" when the blowing behavior occurred. During the preceding 2 months there had been minimal reduction in the blowing behavior and no change in K.'s seizures. K. communicated only through the use of eye gaze aversion, increased blowing and other rhythmical self-stimulatory behaviors when she was spoken to. She was physically very unstable and showed more frequent avoidance behaviors when sitting or standing. K.'s behavior was noticeably improved when she was lying on her

back facing me. All sensory input was reduced. Talking was replaced by the firm but gentle touch of my hands. Visual input was limited to a calm face and an uncluttered wall. K.'s use of gaze aversion and blowing were interpreted as messages of sensory overload and were responded to by further quieting and reduction of input. Within 5 minutes K. became calmer. Blowing/hyperventilating behaviors decreased and there was a noticeable increase in her use of eye contact.

## **THE HYPOTHESIS**

Based on K.'s responses when vestibular, visual and auditory inputs were simplified, the underlying disorder appeared to be one of a severe difficulty with the organization and interpretation of sensory information. It was hypothesized that the rhythmical self-stimulatory behaviors of rocking, thumb sucking and blowing assisted her in organizing her world by blocking out input which was confusing. Her selection of blowing/hyperventilation with resultant seizures was unusual and appeared to be very important to her. Neither the blowing, nor the seizures had been brought under control by medication or behavior modification techniques. It was hypothesized that at a very deep level K.'s system needed these behaviors to achieve a balance. Therefore, attempts to remove the blowing and seizures without dealing with the underlying disorder would prove futile. Changes in breathing patterns have been used in yoga, meditation, rebirthing and other traditions to cleanse the system and provide a pathway to altered states of consciousness. It appeared possible that K.'s rapid, repetitive blowing breathing patterns provided her with a pleasant altered state of awareness. The loss of consciousness due to the seizure which followed would functionally cleanse the system of the severe sensory overload with which she was unable to cope.

An effective treatment program would, therefore, need the following components:

1. An initial emphasis on the simplification of sensory input combined with procedures to obtain a more normal integration of sensory information.
2. The use of techniques which could alter breathing patterns and cleanse and balance the system in a more functional manner than the triggering of seizures.

## **THE TREATMENT PROGRAM**

Music was selected as the initial vehicle for obtaining changes in breathing patterns and a calmer mental state. The Lozanov Suggestopedia approach to accelerated learning utilizes music with a structural characteristic of 4/4 time and 60 beats per minute. According to this approach, the music engages the right hemisphere and uses a rhythmical structure which is in tune with central driving rhythms of the body and of the earth. Breathing rates have been noticeably reduced when a passive concert of this type of music is used as a background for learning new materials.

*Comfort Zone* by Steven Halpern, which contains this musical structure, was selected for K.'s initial therapy sessions. The music provided a consistent auditory background and verbal language was eliminated. An emphasis was placed on the use of firm touch and gentle movement of body parts to assist her in learning a new way of organizing sensory information about her body in space. In the initial 6 treatment sessions, K. was positioned on her back with her body cradled between the legs of the therapist. This reduced the amount of confusing vestibular information which occurred when she was in an upright position. It also made it easy for her to maintain face and eye contact with the therapist if she wished to.

Background music was initially provided via a tape recorder placed near K. During the third session a neck pillow with embedded stereo earphones was used. During the fourth session a Hemi-Sync tape was introduced during the final 10 minutes. This was initially produced through only 1 channel of the headphones in order to introduce a change in the audible signal without producing the internal sensations of Hemi-Sync which might have been confusing or frightening to K. In all subsequent sessions a Hemi-Sync tape was played through the headphones for a period of 15-30 minutes. This was paired with the music tape which continued to be used as background music. The goal was to associate the Hemi-Sync experience with a music tape which could be used to entrain the sensations of hemispheric synchronization. Theoretically this would enable K. to achieve better hemispheric balance at a later time simply by hearing the music.

As K.'s abilities to deal with touch and movement improved, she was no longer satisfied with the restraint of the stereo neck pillow. The use of standard earphones was modified by removing them from the rigid headband and tucking them into small pockets sewn into a child's bonnet. This allowed K. greater freedom in moving from her back to a sitting position without removing the earphones.

Specific problems were experienced with the available Hemi-Sync tapes. It was difficult to find a tape which was appropriate. Tapes containing verbal instructions were over-stimulating and confusing to K. Their use generally resulted in increases in blowing behaviors or in removal of the earphones. This essentially eliminated the use of the Focus 3 tape, *Orientation*, in the DISCOVERY series which would have provided the most gentle change in neurological organization. Tapes such as *Catnapper* and *Recuperation* (in the Emergency Treatment series) contain longer non-verbal sections. These were introduced in a carefully monitored fashion so that sections containing extensive verbal material were presented at a reduced loudness level. During the long segments of Focus 10 signals the music and occasional simple verbal comments were used. Since both of these tapes contain a sleep pattern, it was also difficult to keep K. awake and attentive. The *Concentration* tape was used during one session in an attempt to increase attending behaviors. K. did not reject the tape but fell asleep after 5 minutes. This was interpreted as a type of "clicking out" which indicated that her system was not able or ready to process that type of signal.

Paradoxically, it appeared as that K. needed auditory input other than the Hemi-Sync signal through the earphones. She tended to remove the earphones after approximately 10 minutes and initiate behaviors which were consistently observed in other situations in which she was bored. The only tape which provides a clear auditory signal which is musical rather than verbal is the one entitled *U-Name It*. The tape was described as containing a variety of Hemi-Sync signals designed to take one gently in and out of a meditative state. This tape has been well tolerated by K. and has been used exclusively during the past 3 sessions.

## **RESULTS OF TREATMENT**

K. has been seen for approximately 12 hour-long treatment sessions during the past 4 months. Treatment principles have been carried over into her living unit by her occupational therapist who has attended all therapy sessions. The following results have been observed:

1. During the first two therapy sessions which used only the music, K. became noticeably calmer and stopped her blowing behavior for the full treatment hour.
2. Following the second treatment session, K.'s seizures stopped. At the end of that week she became ill and laboratory tests indicated that the level of seizure medication had become toxic to her system. The anti-convulsant was reduced and changed. K. subsequently became more alert and more available for learning. The seizures did not return even with the reduction in medication.
3. K.'s blowing/hyperventilating breathing pattern stopped completely after 1 month of treatment. It has not returned. A raspberry-type sound is produced with the lips when she is bored or frustrated.
4. K. has been totally free of seizures for three and a half months. In the past she has experienced periods of 2-3 months during which seizures were controlled, but then returned. This is the longest seizure-free period which she has experienced.
5. K. is now maintaining consistent eye contact with adults. She is babbling, enjoying simple interactive gesture games such as "Peek-a-Boo", and is exploring simple toys. She is physically more stable and is using more organized movement patterns in sitting and standing. She has learned to chew and to drink appropriately from a cup. She is able to tolerate simple language input and appears to understand a few words.

## **CONCLUSIONS**

K.'s response to the use of music combined with Hemi-Sync has led to some intriguing observations and questions. One must be cautious in utilizing Hemi-Sync signals with individuals with a history of seizure behaviors. Any technique which alters the electrical energy of the brain may theoretically alter it in such a manner that seizures are triggered. Robert Monroe has stated that the specific energy bands likely to produce seizure discharges have not been included on the Hemi-Sync tapes. The experience with K. definitely supports this

observation. At no time have the tapes triggered seizure discharges in this child. K. has experienced a reduction in seizures during the past 4 months and at the present time they are fully controlled through medication.

It is not possible to separate the effect of the music from the effect of the combined music + Hemi-Sync signal. Noticeable changes in sensory organization and attention began before the Hemi-Sync tapes were added to the program. Subjectively, K.'s physical coordination and interaction improved following the use of the hemi-sync tape. This is very difficult to measure objectively. The music alone was effective. However, it's initial effectiveness may have been increased by intermittent pairing with the Hemi-Sync signal.

K. has provided some unusual insights into potential use of the Hemi-Sync process as a tool in a total therapy program to assist a child in achieving better organization of sensory information. The underlying issues in tape development and implementation are not unique to K.'s program. Similar problems and issues have been experienced with the other young neurologically impaired children with whom I have attempted to use the tapes. The following conclusions have been drawn from these experiences:

1. Tapes designed specifically for young children should use a format of carefully selected music or simple tonal patterns which shift in an interesting fashion from one earphone to the other. Music is a universal language which is more appropriate to the very young child, or the child with limited verbal skills.
2. Tapes could be specifically designed to include musical selections associated with different states or activities. For example, one musical selection could be used to induce a sleep state, another could be used to develop a state of relaxed concentration, a third could achieve a state of active alertness. Each musical selection could be recorded on two tapes, one with a Hemi-Sync bed and the other without. This would allow the musical Hemi-Sync tape to be used with the earphones during a therapy session. The same musical selection could be played on a regular tape recorder in the child's home or classroom at times when a stereo presentation with earphones was impractical. Theoretically the normal music tape would become enhanced in its effectiveness through its intermittent pairing with the Hemi-Sync signal.
3. The use of earphones is problematic for many young children. There is a typical dislike of restraint and/or covering of the ears in children who are developmentally between the ages of 1 and 5 years. Pillow speakers may be effective for children who are passive or have limited movement abilities. Earphones fitted into a small cap or bonnet are more easily accepted by the more active child. Many children will accept neither alternative.
4. The ease with which a state of hemispheric synchronization with specific brain wave characteristics can be achieved and maintained at different activity levels needs to be studied. The normal learning state for the young child is one of physical movement combined with visual-focus. It is difficult to generalize from the quiet, focused adult

experience to that of the child who may be visually engaged, moving about and incapable of a clearly focused state of attention. The Hemi-Sync process would be impractical and unrealistic if it could only be applied in a physically quiet, eyes-closed state.

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